Native-immigrant wage differentials and occupational segregation in the Greek labour market

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Abstract

This paper explores native-immigrant wage differentials in the Greek labour market. Data from the most recent Greek Household Budget Survey (2004-05) were employed, four alternative occupational categories were considered and occupational choice was explicitly modelled. Controlling for occupational selectivity, occupation-specific wage regressions for representative samples of employed native and immigrant workers were estimated and an augmented decomposition technique was utilized to analyze inter and intra occupation wage differentials. The obtained results demonstrate that roughly 48 per cent of the average wage differential can not be explained by differences in observed characteristics and that the larger component of this unexplained part is due to asymmetrical occupational access by native and immigrant workers.

Keywords: wage differentials, immigration, occupational selectivity, Greece.

JEL Codes: J31, J61, O52

1 Introduction

In the beginning of the 1990's and following the collapse of the communist regimes in Eastern Europe, Greece has experienced a massive influx of illegal immigrants (e.g., Angrist and Kugler, 2003). The country had no previous experience on the 'receiving end' of immigration flows and she was unprepared to deal effectively with this new phenomenon. Even today, more than 15 years since the first immigrants arrived, Greece lacks an integrated and coherent immigration policy. And this despite the fact that immigrants comprise a significant minority of Greece's population (7-10%) and labor force (5-10%) and an important part of Greek economic, social and cultural life (OECD, 2005). The integration of immigrants into the Greek economy and society is nowadays a major political issue that arouses heated public discussions. In this paper we investigate only one facet of economic integration, namely the native-immigrant wage differential[1]. Borjas (1990) argues that the existence of a positive native-immigrant wage gap does not necessarily mean that immigrant labour is cheaper but that this differential could arise if there were systematic labour market discrimination against foreign-born workers. Using data from the most recent Greek Household Budget Survey (GHBS) we identify the group of immigrants, according to their country of birth and compare their wages to native Greeks. Typical wage generating functions are estimated and suitable decomposition techniques are applied. Selectivity issues with respect to the apparently important occupational segregation are also addressed. This, to our knowledge, is the first micro-level study of native-immigrant wages in Greece that employs nationally representative cross-sectional data.

The existing literature on the economic aspects of immigration in Greece is rather limited. The newness of the phenomenon and the lack of reliable nation-wide micro data bases have limited its investigation to descriptive aggregate macro-level analysis and a few case studies. Glytsos (1995) presented demographic data for four groups of immigrants and described the related policy framework adopted and applied by the Greek government. Lianos et al. (1996) utilized sample data for 4 prefectures of Northern Greece and concluded that illegal immigrant wages are 40-60 per cent lower than native ones and that immigrants are mostly employed in occupations forsaken by Greeks. Markova and Sarris (1997) concentrated on illegal Bulgarian immigrants and examined entry conditions, sectors of employment, living and working conditions as well as their relations to natives and local authorities.

[1] Borjas, (1999) describes economic assimilation (or, integration) as the process of human capital accumulation that narrows the native-immigrant wage gap.

The study of Sarris and Zographakis (1999) employed a theoretical and empirical approach regarding the effects of illegal migration in Greece. They utilized a small CGE model and reached the conclusion that immigration exerts a detrimental effect on the wages of unskilled labor and a positive effect on the wages of skilled workers. In the process, they assumed a flat immigrant–native wage differential of 40 per cent and that all immigrants offer unskilled work. Lianos and Papakonstantinou (2003) investigated the demographic characteristics of immigrants, their regional distribution and employment status and explored the impact of immigrants on the employment of Greeks, using aggregate data from three distinct Greek statistical sources. Kasimis and Papadopoulos (2005) focused on immigrants employed in Greek agriculture and described their impact on farm operations and local labor markets. Finally, Rovolis and Tragaki, (2006) examined the geographical distribution of immigrants in Greece and identified disparities between different ethnic groups with regard to their educational level and occupational characteristics.

A preliminary inspection of the GHBS data base reveals that indeed foreign-born individuals comprise an important minority, which comes to 7.8 per cent of Greece's population. The share of immigrants from former communist Eastern European Countries (EEC) comes to a notable 73.5 per cent, from Asia, Africa and the Middle East (AAME) to 11.1 per cent, from EU-15 to 8.2 per cent, and from Other Countries- Americas and Oceania- (OC) to 7.2 per cent. The relative importance of the EEC group is profound and it is worth pointing out that roughly 47 per cent of all immigrants in Greece come from Albania. Furthermore and with regard to their employment status, prime–age immigrants, in the [18-64] age category, exhibit substantially higher labor force participation rates than native Greeks (60.97 per cent), especially those from EEC and AAME (70.95 and 70.69, respectively). This finding holds particularly for male immigrants in these groups, who record participation rates almost 12 percentage points higher than natives (see Tables 1 and 2). Figure 1 depicts the densities of observed (ln) hourly wages for native Greeks and two immigrant groups (EEC and AAME+EU-15+OC). We observe that the densities of immigrant wages, those for the EEC block in particular, show greater concentration around their mean, which is clearly lower than the average native wage. Thus, prima facie, the observed wage differentials seem to corroborate the commonly held view that immigrants are discriminated against in the Greek labour market, as far as labor earnings are concerned.

–Insert Table 1 about here–
–Insert Table 2 about here–

–Insert Figure 1 about here–

The paper is organized as follows. In the next section we discuss the sources and the descriptive statistics of the key variables for the two groups of interest, i.e., natives and immigrants. We also perform a basic background analysis of observed wage differentials and present the results of routine decomposition exercises. Section 3 presents the econometric methodology that deals explicitly with occupational choice. The issue of discriminatory practices, as they relate to the occupational distribution of immigrants and an augmented version of the typical Blinder-Oaxaca decomposition technique, that incorporates occupational segregation, are also presented in this section. Section 4 presents and discusses the estimation results. The paper concludes with a summary of the basic findings, policy implications and suggestions for further research.

2 Data and background analysis

Our analysis uses data collected in the GHBS, a nationally representative sample of some 6,555 households, containing approximately 17,386 persons and covering the period February/2004-January/2005[2]. The survey questionnaire draws information about immigrant and labour market status, gender, marital status, region of residence, income and earnings, hours of work, job and family characteristics, education, sector of employment, occupations, housing tenure and conditions, etc. We extracted data for prime-age individuals, i.e., in the 18-64 age bracket and excluded retirees, students, military personnel and self employed. The latter category was excluded because, as a rule, self-employed do not report earnings, when they do they tend to underreport them and furthermore, reported income by the self-employed includes returns to capital as well. Finally, we constructed an hourly wage measure for natives and immigrants from data on monthly earnings and weekly hours of work. The estimating sample comes to a total of 6273 individuals of which 897 are immigrants. The employment rate of the selected sample is 68.1 per cent, i.e., 4274 individuals.

Table 3 presents sample statistics for the major correlates, for the whole sample and separately for the immigrant and native sub-samples. We observe that the average native wage is higher than the immigrant wage by 39.8 percent. It is worth noticing that 87.6 per cent of employed immigrants work in the private sector (vs. 62.1 per cent for the native population), that the

[2]Typically, related empirical studies use Census datasets. However, in Greece, primary Census data are not publicly available to researchers.

percentage of uninsured immigrants is substantially higher than the native one, that the share of immigrants holding temporary jobs is also higher and, finally, that immigrants are primarily employed as 'unskilled workers', 'craft and related workers' and 'service and shop-sales workers'[3]. In contrast, natives are employed mainly as 'clerks', 'service and shop-sales workers', 'craft and related workers' and 'professionals'. Overall, we observe that with regard to demographic characteristics the two groups do not differ substantially. Significant differences appear to exist however with regard to job characteristics and occupations. With regard to the latter, we have calculated a congruence index, as suggested by Welch (1999) and Borjas (2003), as an indicator of the degree of similarity in the occupational distributions of immigrants and natives[4]. The calculated value of the index turned out to be equal to minus one, a finding that suggests clustering of immigrants and natives in different occupations.

–Insert Table 3 about here–

In general, native-immigrant wage differentials are investigated within the human capital paradigm (e.g., Long, 1980; Kee, 1985; Coulon, 2003). Typical Mincerian wage generating functions are estimated first for the two sub-samples (Mincer, 1974; Chiswick, 1978) and a typical Blinder-Oaxaca decomposition analysis is performed in the second stage (e.g., Reimers, 1983; Kee, 1985; Darity et al., 1995; Butcher and Dinardo, 2002). The advantage of the Blinder-Oaxaca decomposition is that it breaks up and measures the contribution of observable characteristics to the estimated average wage differential. As a starting point and for comparison purposes we follow this typical approach.

Table 4 presents the estimated coefficients of the 'immigrant' dummy variable for three alternative wage-generating model specifications[5]. The typical Mincerian wage-generating function, corrected for sample selection,

[3]Borjas (1999) argues that the entrance of immigrants in non-traditional occupations in the host country constitutes a source of faster economic assimilation.

[4]The index takes the value of one when the two groups have identical occupation distributions and minus one when they are clustered in completely different occupations.

[5]Following the empirical tradition of Chiswick (1978), we estimate first a typical human capital earnings function using the pooled sample, i.e., immigrants and natives. An indicator variable for 'immigrant status' is included as an additional argument. Borjas (1985) extended this empirical model by including controls for plausible cohort effects and his fully-specified model incorporates assimilation, cohort and period effects. However, information on 'years of residence' in Greece and 'years since migration' are not available in the GHBS data base and thus, are not included in the present application. Nevertheless, it appears that the basic human capital model explains adequately the earnings distribution of workers in the Greek labour market.

constitutes the base-line specification (column 1)[6]. Twelve regional and 16 sector-of- employment dummies are included as additional arguments in the second specification (column 2). The third specification includes in addition eight occupational dummies (column 3). We observe that the estimated coefficient of immigration on wages is negative and statistically significant across all model specifications, while sample selection with regard to participation appears to be present. The selectivity criterion lambda is negative and statistically significant, indicating that wages of participants are estimated to be lower than those of non-participants who have the same values of the exogenous variables. Notice also that the effect of immigration on wages is substantially reduced when we control for occupations, from -0.12 (2^{nd} specification) to -0.07 (3^{rd} specification). This finding demonstrates that immigration may correlate with certain occupations.

Typical Blinder-Oaxaca decompositions of the estimated wage differentials for the three model specifications are presented at the bottom of Table 4. The wage differentials were estimated from separate estimations of native and immigrant wage generating functions. The obtained decomposition results are quite appealing. The predicted wage differential is higher than the observed raw wage differential between natives and immigrants, across the three specifications, indicating that non-participants have higher reservation wages than participants. Thus, if non-participants were to become participants then the required increase in offered wages would have resulted in an increase in the estimated native-immigrant wage differential. However, this wage gap is reduced substantially when the wage equation is controlled for regional, sectoral and occupational differences. We observe for example that the distance between observed and predicted wage differential has been significantly reduced in the 3^{rd} specification, implying that the occupational distribution of native and immigrant workers does matter. Specifically, the inclusion of occupational variables has caused a notable increase in the share of the estimated wage differentials due to observed characteristics, from 51.0 per cent to 66.1 per cent. This finding provides additional support in favor of the hypothesis that native-immigrant wage differentials do correlate with certain occupations.

–Insert Table 4 about here–

These background results provide sufficient motivation for an explicit analysis of the occupational choices made by immigrants in Greece. One

[6]Since market wages are observed only for labour market participants but not for non-participants (whose reservation wage is higher than the offered one), sample selection issues with respect to participation need to be addressed (Heckman, 1974; Kee, 1995; Shields and Price, 1998; Blackby, et. al., 2002; Newman and Oaxaca, 2004; Blackby et. al., 2005).

could reasonably argue that immigrant wages are lower because they work exclusively in the private sector and their vast majority are employed and paid as 'unskilled labor'. Thus, observed native-immigrant wage differentials may manifest nothing more than existing inter-occupational wage differentials in the Greek labor market. Of course, the fact that immigrants are "attracted" in certain low-paid occupations and seriously under-represented in high-paid ones may entail systematic selectivity issues (Constant and Zimmerman 2003; Newman and Oaxaca, 2004; Liu et al. 2004). In other words, the presence of statistical discrimination cannot be ruled out (Bruce, 1995; Oettinger, 1996). Since immigration is a relatively new phenomenon in Greece, employers lack the experience and the capability to judge the qualifications of immigrants and their capacity to meet the demands of jobs with greater potential for advancement and higher wages (Bruce, 1995). Thus, in the short term, employers classify immigrants as 'unskilled labor' just to be on the safe side and offer the 'good' jobs to natives. In the long term, as more information become available and the real capabilities of immigrants are made known, employers have every reason to pursue a more efficient matching of occupations and employee skills and qualifications. However, if an immigrant, at an early stage, attaches a low probability to the event that he/she will be eventually hired into a high-paid job, where ability and skill are essential factors, then he/she has reduced motivation to invest in related skill acquisition. Thus, even in the long term, this structure of incentives could create a vicious circle that systematically pushes immigrants into low-paid occupations (Greenwood, et al., 1996; Gross, 2004; Hammarstedt, 2006; Tasiran and Tezic, 2007).

Indeed, the recent (2005) OECD report on the economic impact of immigration in Greece and the related empirical evidence indicate that immigrant workers tend to be concentrated in agriculture, household services and construction, performing tasks fit mostly to unskilled or low-skilled labor. This is attributed to the stringent laws of the formal labour market in Greece, i.e., minimum wages for unskilled workers, and to the substantial size of the Greek underground economy, which evidently exhibits an insatiable demand for low-paid labour. The OECD report also asserts that immigration allowed "at least some Greeks to move to higher level jobs". In such a setting, the intra-occupational wage differentials are not expected to be important, i.e., the immigrant –native wage differential within the "unskilled" group for example is expected to be small or non-existent. Furthermore, the fact that immigrants are clustered into the "unskilled" group and under-represented in the "skilled" one, brings into centre-stage the issue of occupational segregation.

3 Econometric methodology

The accumulated empirical evidence suggests that occupational choice cannot be ignored when earnings differentials are investigated. This is because occupations determine earnings and therefore the existence of discrimination in occupational choices is directly transformed into discrimination in earnings (Schmidt and Strauss, 1975, Constant and Zimmerman 2003). Brown et al.1980 suggested an appropriate methodology for assessing inter and intra-occupation wage effects, by explicitly modelling occupational choice. This methodology was applied widely in the investigation of gender and race wage differentials and more recently (Liu et al. 2004) for analyzing native-immigrant wage differentials in Hong-Kong.

In the present paper we follow closely Brown's methodology. We re-coded the eight occupational categories, available in the GHBS, for two reasons. First, because certain occupations in the estimating sample are reported by a very small number of immigrants and second, because some of the existing occupational categories appear to be perfect or very close substitutes. This re-coding, which resulted into four broad occupational categories (see Table 5), facilitates the estimation of occupation-specific wage equations and ensures that the available alternative choices are more or less distinct, (see Constant and Zimmerman, 2003).

Following this, wage equations for both, native and immigrant workers are specified for each of the four occupational categories as follows:

$$\begin{aligned} \ln w_{ij}^{N} &= X_{ij}^{N}\beta_{j}^{N} + e_{ij}^{N}, \qquad j = 1, ..., J \\ \ln w_{ij}^{I} &= X_{ij}^{I}\beta_{j}^{I} + e_{ij}^{I}, \qquad j = 1, ..., J \end{aligned} \tag{1}$$

where, w_{ij} is the hourly wage rate for the ith worker in the jth occupation, X_{ij} is a vector of observed independent correlates that determine occupation-specific wages, β_j is the vector of parameters to be estimated and e_{ij} is the error term. The indicators N and I denote natives and immigrants, respectively. Taking into account the proportions of natives and immigrants in each occupation, $P_j^N$and P_j^I, respectively, the sample mean wage differential (Liu et. al., 2004) becomes:

$$\overline{\ln w}^{N} - \overline{\ln w}^{I} = \sum_{j=1}^{J} \left(P_j^N \ \overline{\ln w}_j^{N} - P_j^I \ \overline{\ln w}_j^{I} \right) \tag{2}$$

The average wage differential is in essence a weighted average of occupational wage differentials, the weights being the proportions of immigrants and natives in each occupational category. Of course, the occupational distribution of immigrants may be different from the distribution of natives,

for reasons unrelated to their observed characteristics, i.e., discrimination. In other words, the observed distribution of immigrants in each occupation needs to be compared with the distribution that would have resulted in the absence of discrimination. Hence, the estimation of occupation-specific wage regressions (1) should account for the possible divergence of the observed from the non-discriminatory occupational structure of immigrants. This in turn creates the need for an explicit treatment of occupational choice.

Occupational choice is usually approached empirically through a reduced form multinomial logit model (Brown, et. al., 1980; Green, 1999; Constant and Zimmerman, 2003; Liu, et al. 2004). The model predicts the probability that an individual, with known characteristics, will choose a certain occupation from a set of several un-ordered alternative occupations. Thus, the choice probability P_{ij} of the ith individual for the jth occupation, conditional on the set of observed individual correlates Z_i becomes:

$$P_{ij} = \Pr\left(y = j \mid Z_i\right) = \frac{e^{\left(\gamma_j Z_i\right)}}{\sum_{k=1}^{J} e^{\left(\gamma_j Z_i\right)}}, \qquad j = 1, ..., J \tag{3}$$

where, γ_k is the vector of coefficients of the set of independent variables Z_i, corresponding to the kth occupation. For identification purposes we impose the restriction that the vector of the estimated coefficients of the reference occupation is equal to zero (Greene 2003, p. 721). The model is estimated using a) the native sub-sample and b) conventional maximum likelihood methods (MLE). The resulting parameter estimates are unbiased, consistent and asymptotically efficient. The estimated coefficients of the occupational choice model describe the structure of the labor market under investigation, with respect to the occupational choices made by native workers. Then, using the observed characteristics of the immigrant sub-sample we can predict for every immigrant the probability of choosing a specific occupation, $\hat{P}_j^I$.

If the estimated probabilities of occupational choice $\hat{P}_j^I$ differ from the observed proportion P_j^I then the allocation of immigrants into each occupation may not be random. If this is the case, then the occupational wage equations for immigrants and natives should be adjusted for occupation-specific selectivity bias. The adjustment utilizes information from the estimation of the occupational choice probabilities of equation (3). Thus, the occupation-specific wage equation conditional on occupation j being chosen is:

$$\ln w_{ij} = X_{ij}\beta_j + \hat{\lambda}_{ij}\theta_j + \epsilon_{ij} \tag{4}$$

where, $\theta_j = \sigma_j \varrho_j$, σ_j is the standard deviation of the error term in (4) and ϱ_j is the correlation between the error terms of (4) and (3) and where, $\hat{\lambda}_j =$

$\frac{\varphi\left[\tau\left(Z_j\hat{\gamma}_j\right)\right]}{F\left(Z_j\hat{\gamma}_j\right)}$, $\varphi\left[\cdot\right]$ is the standard normal density function, $\tau\left(\cdot\right)=\Phi^{-1}\left(F\right)$, Φ is the standard normal distribution function and F is the distribution function of the multinomial logit probabilities defined in (3). Occupational selectivity bias is controlled for by including $\hat{\lambda}_j$ in the estimated regression. Equation (4) is estimated separately for the native and immigrant sub-samples.

Recall that the typical Blinder-Oaxaca decomposition, applied in section 2, with occupational dummies included as independent variables, is based on the assumption that occupational choice is random. However, if the distribution of immigrants across occupations is shaped by discriminatory factors and this is ignored then the estimated native-immigrant wage differential will be biased. The legitimacy of the decomposition that is based on biased estimated wage differentials is also questionable. Thus, the typical decomposition method of the estimated average wage differential needs to be augmented, in order to account for the possible presence of occupational selectivity. In this case, the overall average wage differential, as it is described in (3), can be decomposed into four distinct components as follows:

$$\begin{aligned}\overline{\ln w}^N-\overline{\ln w}^I= & \sum_{j=1}^{J}P_j^I\hat{\beta}_j^N\left(\overline{X}_j^N-\overline{X}_j^I\right)\\ & +\sum_{j=1}^{J}P_j^I\overline{X}_j^I\left(\hat{\beta}_j^N-\hat{\beta}_j^I\right)\\ & +\sum_{j=1}^{J}\overline{\ln w}_j^N\left(P_j^N-\hat{P}_j^I\right)\\ & +\sum_{j=1}^{J}\overline{\ln w}_j^N\left(\hat{P}_j^N-P_j^I\right)\end{aligned} \tag{5}$$

The first and third components account for the 'explained' part of the differential and the second and fourth components for the 'unexplained' one. The 'explained' part captures the portions of the wage differentials due to differences in observed characteristics between natives and immigrants. The 'unexplained' part of the wage differential captures differences in returns that could be due to discrimination. Furthermore, the first two components account for the intra-occupational wage differential and the last two for the inter-occupational wage differential. Finally, the last component, i.e., inter-occupational 'unexplained' part, provides an indication for the equality of access between natives and immigrants to various occupations, Liu et al., (2004).

4 Estimation results

With regard to the occupational achievement equation (3), the key explanatory variables in Z include potential experience and its squared term[7], education, gender and an urban/non-urban dummy[8] (e.g., Constant and Zimmerman, 2003). The results presented in Table 6 are based on the estimation of the multinomial logit model, using the native sub-sample. The first two columns present the actual occupational distribution of natives and immigrants. We observe that indeed immigrants are over-represented in the last two occupation categories ('production workers' and 'unskilled labour') and under-represented in the first two categories. The third and fourth columns present the predicted by the model distribution of natives and the predicted non-discriminatory occupational distribution of immigrants. It can be seen that the model predicts accurately the distribution of natives, while the results for the immigrant sub-sample indicate that a significant occupational reallocation would have resulted in a non-discriminatory setting. Given their observed characteristics, immigrants would shift away from the categories of 'unskilled labour' and 'production workers' and move into the other two categories. Furthermore, the last three columns of Table 6 indicate that the differences in observed native-immigrant occupational distributions cannot be explained by differences in observed characteristics (Z) but rather they are caused by unobserved factors (unexplained part). The fact that P_j^I and $\hat{P}_j^I$ diverge so extensively clearly implies that the labour market in Greece treats immigrants differently than natives[9].

–Insert Table 6 about here–

Table 7 presents the estimated results of the occupation-specific wage generating functions, for natives and immigrants, when occupational self-selection is taken into consideration and corrected for. Overall, the model fits the data adequately, with R^2 values ranging from 0.26 to 0.53. Several

[7]Data on 'actual' experience are not available and for this reason we use 'potential' experience, i.e., education-corrected age. We assume also that the ratio of 'actual' to 'potential' experience does not vary across ethnic groups, not an unrealistic assumption given the ethnic composition of the immigrant labour force (e.g., 73.5% from Eastern European Countries).

[8]Due to small-sample restrictions, instead of regional dummies we include an indicator which identifies residence in urban regions (e.g., Gabriel and Schmitz, 1989). The same indicator is used during the estimation of occupation-specific wage equations.

[9]Greenwood and McDowel (1982) argue that occupational skills are not perfectly transferable between countries. However, they confirm that educational background does play a role and furthermore, immigrants with higher educational attainment may also find substantial demand for their skills in the host country.

points are worth making. The effects of potential experience and its squared term reveal the existence of an inverse U-shaped relationship (in all occupations but 'unskilled labour') but this profile is statistically valid only for the native sub-sample. Educational attainment is important for natives but only in the "service workers" and "production workers" occupations. For immigrants, tertiary education exerts a positive effect on the wages of "production workers" and a negative one on "unskilled labour", when compared to those that attended only primary school. Married native workers gain higher wages, with the exception of unskilled labourers, while this relationship could not be confirmed for the immigrant sub-sample. Working in the previous year affects positively and significantly wages for both natives and immigrants across occupations. For the native sub-sample, the impact of this variable is very important for service and unskilled workers, implying that 'persistence' acts as 'experience' that generates higher current returns. This effect is also consistent across occupations regarding the immigrant sub-sample of workers. Working in the private sector, negatively affects native wages, while the same does not seem to hold for immigrants, with the exception of service workers. Holders of temporary work contracts, natives and immigrants, seem to receive lower wages (Zorlu and Hartog, 2005), while part-timers appear to enjoy higher hourly wages.

–Insert Table 7 about here–

In addition, the occupational selectivity parameter $\hat{\lambda}_j$ is statistically significant in five out of eight wage regressions. Specifically, occupational self-selection is present for the immigrant sub-sample in all but the first occupational category. Furthermore, the identified selectivity exerts a positive effect on the immigrant wage of 'service workers' and 'unskilled labour' and a negative one on 'production workers'. This clearly implies that the choice of these occupations by immigrants is not random. The selectivity parameter for the native sub-sample is statistically significant in the "service workers" and "production workers" occupations. Its effect is positive in the first case and negative in the second one. This finding implies that the unobserved factors that push natives into various occupations correlate negatively or positively with their wages. The differentiated effects of occupational selectivity, among occupations and between natives and immigrants, which are observed in the present study, were also identified in the related international literature (e.g. Liu et al., 2004).

–Insert Table 8 about here–

The upper part of Table 8 presents the mean values of the variables in the X matrix, for natives and immigrants, which were employed for the estimation of the occupation-specific wage generating equations, (presented at Table 7). Using these values together with the estimated $\hat{\beta}_j^N$, $\hat{\beta}_j^I$ (Table 7) and $P_j^I, \hat{P}_j^I, P_j^N, \hat{P}_j^N$ (Table 6), we can proceed with the four-way decomposition of the average native-immigrant wage differential as described in (5). The results appear at the lower part of Table 8. First, recall that the average (ln)wage differential between natives and immigrants comes to 0.335. Second, the decomposition shows that 51.9 per cent of this differential can be attributed to endowment differences between natives and immigrants, i.e., observed correlates, while the remaining 48.1 per cent is unexplained. Third, the explained part, i.e., 51.9, is primarily attributed to within- occupations endowment differences (46.3 points) and to a much lesser extent to between-occupations differences (5.7 points). Fourth, the unexplained part, i.e., 48.1, concerns primarily between-occupations differences (43.3 points) and substantially less within-occupations differences (4.8 points). In other words, we could conclude that the unexplained part of the observed native-immigrant wage differential relates primarily to inter-occupational unobserved factors rather than to intra-occupational ones. This finding may in turn imply that immigrants, unlike natives, face difficulties in gaining access to certain occupations. That is, if we assume that the observed wage differentials reveal discrimination, then this discrimination relates primarily to unequal occupational access between Greek and foreign-born workers rather than unequal treatment within a given occupation. In other words, once an immigrant gains access to a certain occupation then the issue of discrimination, as far as earning differentials are concerned, becomes relatively unimportant.

5 Summary and policy implications

In this paper we investigated, for the first time, native-immigrant wage differentials in the Greek labour market. We have employed the most recent GHBS (2004-05) data base, we considered four alternative occupations and we explicitly accounted for occupational selectivity. Occupational choice was approached through a multinomial logit model. Controlling for the usual individual and job-related characteristics and for occupational selectivity, we estimated occupation-specific wage equations for representative samples of employed native and immigrant workers. Following this, an augmented decomposition technique was utilised in order to allocate unexplained native-immigrant wage differentials to within- and between-occupations unobserved factors.

Our results demonstrate that native workers enjoy significantly higher wages than immigrants and that this differential is to a large extent, around 48 per cent, unexplained by differences in observed characteristics of the two worker-groups. Furthermore, the decomposition analysis reveals that roughly 90 per cent of the unexplained part can be attributed to between-occupations differences and 10 per cent to within-occupations ones. This finding implies in turn that the underlying cause of observed wage differentials is the asymmetrical occupational access of natives and immigrants and not their unequal treatment within a given occupation. Indeed, it is found that immigrants are over-represented in low-paid jobs ("production workers" and "unskilled labour") and under-represented in high-paid ones (legislators, managers, professionals, assistants and "service workers"). Moreover, the utilized occupational-choice model predicts that large numbers of immigrants will move out of low-paid jobs and into high-paid ones, in a labour market setting that would provide equal occupational access and opportunities.

The obtained results could be helpful in formulating a more appropriate immigration policy, aiming at a smoother assimilation of immigrants into the Greek economy. Closing of the native-immigrant wage differential, i.e., a major aspect of assimilation, requires policies that will address two major issues: a) the asymmetrical occupational access of natives and immigrants and b) the within-occupations wage differentials. The results of the present study indicate that (a) is much more important than (b). In other words, the under-representation of immigrants in high- skilled and paid occupations is the result of systematic factors rather than random ones and indicates the existence of invisible barriers ('glass ceiling') that prevent them from moving into high-wage occupations. Thus, policies need to be designed to improve the access of immigrants to high-paid jobs in the public and private sectors of the Greek labour market. For example, hiring quotas for qualifying immigrants in the public sector need to be considered. Similarly, an active labour market policy that assists employers to achieve better matching between job requirements and employee skills and qualifications could also improve access to high-paid jobs by immigrants. It is evident that if technical and professional skills of immigrants are ignored then Greece is not using efficiently its available workforce. On the other hand, continuous on-the-job training, specific and general, of immigrants could also be helpful in alleviating within-occupation native-immigrant wage differentials.

The results of the background analysis (Section 2) revealed the presence of selectivity with respect to labour market participation. Selectivity implies that the native –immigrant 'wage-offer' differential is larger than the observed wage differential, (Reimers, 1983; Blau and Beller, 1988; Miller, 1987; Kee, 1995). In other words, if currently non-participating natives were

to become participants then the immigrant-native earnings differential would have been larger, ceteris-paribus. Thus, the simultaneous treatment of participation and occupational selectivity, along perhaps the lines suggested by Dolton et. al., (1989), seems like a natural extension of the present study. This is certainly a more meaningful exercise for female workers, native and immigrant, who exhibit significantly lower participation rates than males.

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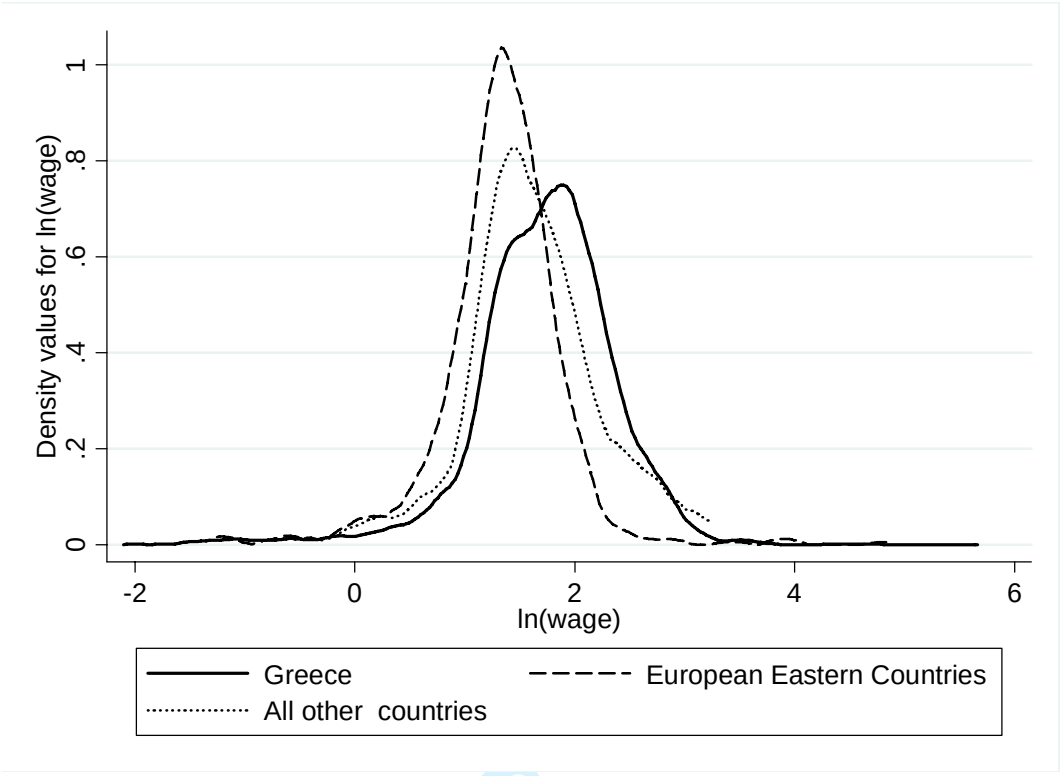

Figure 1. Densities of observed (ln) hourly wages for native Greeks and two immigrant groups (Eastern European countries and all other countries)

Table 1. Ethnic composition of immigrants in Greece

	% of total population	% of total immigrant population
EU-15[1]	0.6	8.2
EEC[2]	5.7	73.5
AAME[3]	0.9	11.1
OC[4]	0.6	7.2
Total Immigrants	7.8	100
Native Greeks	92.2	-
TOTAL population	100	-

[1] European Union-15, [2] Former Communists Eastern European Countries, [3] Asia, Africa and the Middle East, [4] Americas and Oceania

Source: Own calculations, GHBS, 2004-2005

Table 2. Employment status of immigrants and natives, [18-64] age bracket

	EU-15[1]	*EEC*[2]	*AAE*[3]	*OC*[4]	*Native Greeks*	*Sample averages*
Total Sample						
Employed	59.55	70.94	70.69	60.52	60.97	61.79
Unemployed	8.99	5.71	4.31	2.63	5.73	5.72
Retired	3.37	1.17	3.45	1.32	7.37	6.79
Inactive[1a]	28.09	22.18	21.55	35.53	25.93	25.7
TOTAL	100	100	100	100	100	100
Men						
Employed	81.82	87.43	86.77	70.37	75.03	76.09
Unemployed	15.15	6.83	4.41	3.7	5.21	5.37
Retired	0	1.37	2.94	0	9.1	8.36
Inactive[1a]	3.03	4.37	5.88	25.93	10.66	10.18
TOTAL	100	100	100	100	100	100
Women						
Employed	46.42	56.05	47.91	55.1	47.61	48.29
Unemployed	5.36	4.69	4.17	2.04	6.23	6.05
Retired	5.36	0.99	4.17	2.04	5.71	5.31
Inactive[1a]	42.86	38.27	43.75	40.82	40.45	40.35
TOTAL	100	100	100	100	100	100

[1a] pupils, students, soldiers, housewives, incapacitated,
[1]European Union-15, [2] Former Communists Eastern European Countries,
[3] Asia, Africa and the Middle East
Source: Own calculations, GHBS, 2004-2005

Table 3. Definition of variables and descriptives ('employed' sub-sample)

Variabe	*Definition*	*Total*		*Natives*		*Immigrants*	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Wage	Hourly wage rate in €	5.36	1.91	5.66	1.90	4.04	1.78
Age	Age in years	38.73	10.56	38.97	10.55	37.46	10.50
Exper	Potential experience (Age-yrs in educ)	27.28	11.21	27.45	11.33	26.40	10.51
Secondary	1 if secondary education, 0 otherwise	0.57	0.49	0.55	0.49	0.67	0.46
Tertiary	1 if tertiary education, 0 otherwise	0.26	0.44	0.27	0.44	0.19	0.39
Female	1 if sex is female	0.41	0.49	0.42	0.49	0.40	0.49
Married	1 if married, 0 otherwise	0.61	0.48	0.60	0.48	0.66	0.47
Hsize	Household size	3.39	1.21	3.39	1.20	3.40	1.24
Emplt-1	1 if employed last year, 0 otherwise	0.87	0.33	0.88	0.31	0.79	0.40
Part-time	1 if employed on a part-time basis, 0 otherwise	0.05	0.23	0.05	0.23	0.06	0.24
Private	1 if employed in the private sector, 0 otherwise	0.66	0.47	0.62	0.48	0.87	0.33
Uninsured	1 if uninsured, 0 otherwise	0.03	0.17	0.01	0.13	0.09	0.29
Tempcont	1 if employed on a temporary contract, 0 otherwise	0.18	0.38	0.16	0.37	0.28	0.45
Occupations (dummies)							
Legislators, Managers, Administrators, Senior Officials		0.01	0.13	0.02	0.14	0.01	0.06
Professionals		0.12	0.32	0.13	0.34	0.03	0.19
Associate professionals		0.06	0.24	0.07	0.26	0.02	0.15
Clerks		0.21	0.41	0.24	0.43	0.05	0.21
Service and shop-sales workers		0.18	0.38	0.18	0.38	0.16	0.37
Skilled agricuture and fishery workers		0.01	0.08	0.01	0.08	0.01	0.10
Craft and related workers		0.17	0.38	0.15	0.35	0.32	0.46
Plant and machine operators and assemblers		0.06	0.25	0.07	0.25	0.04	0.20
Unskilled labour		0.12	0.33	0.08	0.27	0.34	0.47
Number of observations		*4274*		*3580*		*694*	

Table 4. Estimated effects of immigrant status on (ln)wages and decompositionof the estimated native-immigrant wage differentials

	(1)	(2)	(3)
	coef.	coef.	coef.
Immigrant status	-0.155	-0.124	-0.076
	(0.021)	(0.022)	(0.021)
Selectivity term	-0.271	-0.137	-0.139
	(0.061)	(0.058)	(0.056)
Oaxaca-type wage *decomposition*			
Raw differential	0.335	0.335	0.335
Predicted differential	0.483	0.392	0.366
Due to endowments	0.204	0.201	0.242
% Due to endowments	0.422	0.511	0.661
Due to discrimination	0.279	0.192	0.124
% Due to discrimination	0.578	0.493	0.339

Robust standard errors in parentheses. Wage regressions corrected for sample selection. Exogenous variables included in Specification (1): exper, exper-squared, secondary, tertiary, female, married, hsize, emplt-1, private, tempcont, uninsured, part-time, in Specification (2): as in (1) plus 12 regional and 16 sectoral dummies, in Specification (3): as in (2) plus 8 occupational dummies.

Table 5. Occupational categories

Categories	*Coding*	*Occupation in GHBS*
Highly skilled	1	Legislators, Managers, Administrators, Senior Officials, Professionals, Associate Professionals
Service workers	2	Clerks, Service and Shop-sales workers
Production workers	3	Skilled agriculture and fishery workers, Craft and related workers, Plant and machine operators and assemblers
Unskilled labour	4	Unskilled labour

Table 6. Actual and predicted probabilities of occupational attainment by native (N) and immigrant (I) workers

	Observed distribution		*Predicted distribution*		*Observed difference*	*Explained difference*	*Unexplained difference*
	N	**I**	**N**	**I**			
	(1)	*(2)*	*(3)*	*(4)*	*(1)-(2)*	*(1)-(4)*	*(4)-(2)*
Highly skilled	0.238	0.065	0.238	0.198	0.173	0.04	0.133
Service workers	0.442	0.215	0.442	0.478	0.227	-0.036	0.263
Production workers	0.234	0.377	0.234	0.245	-0.143	-0.011	-0.131
Unskilled labour	0.086	0.343	0.086	0.079	-0.257	0.007	-0.264

Table 7. Estimated wage equations corrected for occupational self-selection: natives (N) and immigrants (I)

	Highly Skilled		*Service workers*		*Production workers*		*Unskilled labour*	
	N	*I*	*N*	*I*	*N*	*I*	*N*	*I*
Intercept	1.031	5.235	0.161	0.508	0.694***	0.85***	0.179	0.710*
	(1.222)	(6.558)	(0.119)	(0.315)	(0.148)	(0.210)	(0.353)	(0.442)
Exper	0.040***	0.027	0.027***	0.025	0.028***	0.026**	0.027	-0.010
	(0.011)	(0.074)	(0.005)	(0.020)	(0.008)	(0.011)	(0.017)	(0.028)
Exper-squared	-0.0005***	-0.0005	-0.0003***	-0.0004	-0.0004***	-0.0005***	-0.0003	0.0002
	(0.0001)	(0.0010)	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0002)	(0.0005)
Secondary	-0.096	-0.999	0.293***	0.106	0.221***	0.095	0.011	-0.111
	(0.352)	(1.879)	(0.059)	(0.201)	(0.040)	(0.073)	(0.093)	(0.101)
Tertiary	0.080	-3.462	0.345***	0.196	0.661***	0.371**	-1.336	-0.399***
	(0.837)	(4.395)	(0.058)	(0.177)	(0.094)	(0.172)	(1.046	(0.139)
Married	0.139***	-0.004	0.085***	-0.050	0.179***	0.153*	-0.009	-0.002
	(0.045)	(0.289)	(0.026)	(0.085)	(0.038)	(0.056)	0.071	(0.086)
Hsize	0.118	0.169*	-0.051*	-0.051*	-0.022*	0.017	0.032	0.031
	(0.013)	(0.101)	(0.008)	(0.029)	(0.013)	(0.020)	(0.021)	(0.028)
Empl. t-1	0.607***	0.500*	0.845***	0.762***	0.742***	0.525***	0.809***	0.690***
	(0.113)	(0.258)	(0.068)	(0.143)	(0.076)	(0.082)	(0.129)	(0.119)
Private	-0.167***	-0.111	-0.276***	-0.413***	-0.232***	-0.137	-0.236***	0.022
	(0.036)	(0.164)	(0.023)	(0.129)	(0.028)	(0.137)	(0.068)	(0.166)
Temp. contract	-0.151**	-0.338*	-0.214***	-0.214***	-0.136***	-0.118***	-0.263***	-0.075
	(0.076)	(0.187)	(0.044)	(0.087)	(0.049)	(0.062)	(0.097)	(0.096)
Uninsured	-0.443*	-0.0001	-0.120	-0.275**	-0.622***	-0.055	-0.117***	-0.038
	(0.237)	(0.187)	(0.158)	(0.135)	(0.249)	(0.010)	(0.245)	(0.115)
Part-time	0.217**	-0.196	0.391***	0.577***	0.294***	0.424**	0.725***	0.373***
	(0.112)	(0.681)	(0.077)	(0.145)	(0.104)	(0.199)	(0.137)	(0.122)
Urban	-0.053	0.514*	0.050*	0.200*	0.121***	0.267***	0.079	-0.019
	(0.068)	(0.240)	(0.030)	(0.105)	(0.033)	(0.096)	(0.074)	(0.088)
λ	-0.105	-1.991	0.193***	0.260**	-0.325***	-0.375***	0.020	0.011***
	(0.415)	(2.146)	(0.046)	(0.119)	(0.052)	(0.108)	(0.013)	(0.003)
F-test	45.09***	6.82***	80.80***	8.33***	30.74***	6.29***	9.87***	4.98***
R-squared	42.8	53.2	50.2	49.1	51.7	39.2	39.2	26.1
Observations	837	45	1551	149	822	261	302	238

λ is the occupational selectivity term as described in the text.
Asteriscs denote statistical significance at, ***1%, **5% and *10%

Table 8. Occupation-specific average observed characteristics and occupational native (N)-immigrant (I) wage differential decomposition

	Highly Skilled		Service workers		Production workers		Unskilled labour	
	N	I	N	I	N	I	N	I
Hourly wage (in €)	2.153	2.002	1.64	1.367	1.588	1.482	1.387	1.209
Exper	26.122	26.178	25.61	23.752	30.428	25.808	34.119	28.777
Exper-squared	777.259	771.244	769.662	661.51	1075.443	773.962	1311.417	944.055
Secondary	0.235	0.212	0.718	0.752	0.633	0.736	0.401	0.651
Tertiary	0.749	0.756	0.191	0.221	0.047	0.111	0.007	0.155
Married	0.659	0.556	0.549	0.631	0.646	0.671	0.616	0.693
Household size	3.268	3.244	3.34	3.188	3.578	3.575	3.513	3.395
Emplt-1	0.918	0.822	0.899	0.812	0.866	0.801	0.791	0.782
Private	0.407	0.612	0.648	0.846	0.814	0.904	0.682	0.92
Tempcont	0.122	0.222	0.147	0.154	0.176	0.241	0.351	0.42
Uninsured	0.008	0.000	0.019	0.074	0.018	0.061	0.043	0.176
Part-time	0.049	0.067	0.058	0.04	0.034	0.023	0.142	0.122
Urban	0.871	0.844	0.814	0.893	0.685	0.862	0.666	0.811
λ	0.864	0.884	0.767	0.744	0.989	1.110	3.075	7.069
			Expressed in logs				*Expressed as % of the (WD)*	
Within-occupations diffential								
Endowments[1]			0.155				46.3	
Unexplained[2]			0.016				4.8	
Total			0.171					
Between-occupations diffential								
Endowments[3]			0.019				5.7	
Unexplained[4]			0.145				43.3	
Total			0.164					
Total explained[5]			0.174				51.9	
Total unexplained[6]			0.161				48.1	
Observed wage differential (WD)			0.335				100	

λ is the occupational selectivity term as described in the text.

[1] $\sum_{j=1}^{J} P_j^I \hat{\beta}_j^N \left(\overline{X}_j^N - \overline{X}_j^I\right)$; [2] $\sum_{j=1}^{J} P_j^I \overline{X}_j^I \left(\hat{\beta}_j^N - \hat{\beta}_j^I\right)$; [3] $\sum_{j=1}^{J} \overline{\ln w}_j^N \left(P_j^N - \hat{P}_j^I\right)$; [4] $\sum_{j=1}^{J} \overline{\ln w}_j^N \left(\hat{P}_j^N - P_j^I\right)$

[5] (1) + (3); [6] (2) + (4)